MICROENCAPSULATION OF VITAMIN D BY USING NATURAL POLYMERS (PECTIN & CELLULOSE)

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Abstract. Microencapsulation is the latest technology in the food industry. It is used to raise the controlled activity of biologically active components of food products, while production, storage and to transport them to the destination location in the body of a human being [1]. Many industries are using Microencapsulation technology, such as the medical industry for drug delivery systems [2], the manufacturing of food for retaining taste and flavor, and the Cell microencapsulation in bioengineering [3].

Vitamin D is fat soluble vitamin and plays a significant role in calcium balance and retaining bone structure. Because of less exposure to sunlight and limited natural sources of vitamin D, deficiency of it is reported in previous years [4].To increase the bioavailability of vitamin D, it can encapsulate by synthesis of micro-gel based delivery systems [5]. We present here the novel method for encapsulation of fat-soluble compounds using microgels of natural polymers.

The Gelling ability of Pectin and cellulose increase the importance of them to use in the food sector [6]. Pectin and cellulose are the polysaccharides aimed to form nanoparticles during cross-linkage with polyamines. In this work, we used diisocyanides to promote the interaction between polysaccharides and diamines. Microgels can be formed by the combination of a mixture of diisocyanides/diamines and formaldehyde at optimizing pH and room temperature as follows:

$$POLYMER - COOH + NH_2(CH_2)n - NH_2 + CN - (CN_2)_n - NC + CH_2O \rightarrow POLYMER - CO - N(-(CH2)n - NH_2) - CH2 - CO - NH - (CH_2)_n - NH - CO - POLYMER \quad (1)$$

During the optimization stage, we have found the optimal ratio between the participants of this process and obtained the microgels with desired parameters (size, surface charge, cross-linkage density). We have revealed that these microgels can form stable Pickering emulsions. On this basis, we plan to encapsulate vitamin D in the form of oil emulsions. The main challenge of this study is to get the optimal size of vitamin D microcapsule to make a stable food emulsion.

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